

Extreme precipitation events and related impacts in western Iberia

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Abstract Flash flooding induced by extreme precipitation events is one of the deadliest natural hazards in the Iberian Peninsula. In this study we perform an assessment of the most extreme precipitation events that occurred over the last century in Portugal, and which produced flash flooding, urban inundations and landslides, causing considerable infrastructure damage and human fatalities. This analysis provides an in-depth characterization of the synoptic conditions and large-scale dynamic mechanisms that promoted the events, primarily associated with low pressure systems that passed over the area. We show that these events are usually triggered by poleward water vapour transport from the tropics and subtropics enhanced by extratropical cyclones. Recent work has shown that quite often these lows favoured large streams of (sub) tropical air across the North Atlantic – the so-called atmospheric rivers. The relationship between North Atlantic atmospheric rivers, extratropical cyclones and the occurrence of heavy precipitation and flash-flood events on Iberia is also addressed.

Key words heavy precipitation; flash-flooding; high impact hazards; hydro extremes; extratropical cyclones; heat and moisture transport pathways; Portugal